

## SECTION 02551

### NATURAL GAS DISTRIBUTION

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#### **LANL MASTER CONSTRUCTION SPECIFICATION**

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the LANL Engineering Standards Manual (ESM) Civil POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within "stars" during editing.

Coordinate Specification with Civil Standard Drawings ST-G30GEN-1, ST-G3060-1, and ST-G3060-2.

Specification developed for ML-3 / ML-4 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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#### PART I GENERAL

##### 1.1 SECTION INCLUDES

- A. Site distribution gas piping system including above grade piping and appurtenances upstream of and including the low pressure regulator station.

##### 1.2 LANL FURNISHED AND INSTALLED EQUIPMENT

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Furnished and installed gas regulator stations are limited to stations identified in Civil Standard Drawings ST-G3060-2.

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- A. LANL's Support Services Subcontractor (SSS) will furnish, install, and adjust pressure of gas regulator station.

##### 1.3 LANL PERFORMED WORK

- A. LANL's SSS will tie into existing gas piping system.

## 1.4 SUBMITTALS

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Submittals shall be approved by the LANL Utilities Group gas system representative.

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### A. Submit the following in accordance with Section 01330, Submittal Procedures:

1. Catalog data on pipe materials, pipe fittings, valves, pipe coating, pipe pig, and accessories, and directional drilling pull (weak link) device and casing seals.
2. Certified material inspection report for pipe.
3. Certification of welders and qualified welding procedure.
4. Certified Welding Inspector (CWI) inspection report
5. Radiographic film and evaluation reports.
6. Submittals for the Horizontal Directional Drilling.
7. Pipe pigging inspection report.

## 1.5 QUALITY ASSURANCE

### A. Welders Certification, Qualified Procedure Standard, and Weld Inspection/Testing.

1. Exterior Steel Pipe: API Standard 1104
2. Plastic Pipe: 49 CFR 192.283 and 192.285, and C. P. Chem Performance Pipe (Driscopipe) heat fusion qualification guide.
3. Weld Inspection: Comply with 49 CFR 192.287 for PE pipe.
4. Weld Inspection and Radiographic Examination: Comply with API Standard 1104 for steel pipe.

### B. Clean and pig piping 4 inch diameter and larger, and all piping lengths greater than 500 feet.

## PART 2 PRODUCTS

### 2.1 PRODUCT OPTIONS AND SUBSTITUTIONS

#### A. Alternate products may be accepted; follow Section 01630, Product Options and Substitutions.

## 2.2 POLYETHYLENE PIPING, BELOW GRADE

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Do not use polyethylene piping when design pressure exceeds gauge pressure of 100 psig (49 CFR 192.123). Provide 1 inch, 1-1/4 inch, 2 inch, or 3 inch PE service line and 2 inch minimum PE main line.

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- A. Manufacturer: C. P. Chem Performance Pipe (Driscopipe 8100), no substitution.
- B. Pipe: Polyethylene, high density, ASTM D2513, PPI-PE3408, SDR11 iron pipe size, cell classification number 345564C per ASTM D3350. Provide and install SDR-9 polyethylene pipe when performing horizontal directional drilling or other pipe pulling operation.
- C. Fittings: Polyethylene, high density, butt heat fusion type, ASTM D3261, PPI-PE3408, SDR 11, cell classification number 345564C per ASTM D3350.

## 2.3 STEEL PIPING, BELOW GRADE

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Contact a LANL Utilities Group gas system representative for approval to use steel piping below grade. Provide minimum 2 inch steel service line.

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- A. Pipe: Standard wall, black steel, ASTM A53, Type E, Grade B or API 5L EW, Grade B or ASTM A106, Grade B.
- B. Fittings: Standard wall, black steel, butt-welding type, ASTM A 234, Grade WPB.
- C. Coating: Factory applied fused system consisting of; an adhesive primer layer, with minimum 10 mil thermoplastic elastomer layer and minimum 40 mil polyolefin top layer containing UV protection; or alternate of an epoxy primer layer with minimum 50 mil high density polyethylene top layer; or an approved equal by the LANL Utilities Group gas system representative.

Manufacturers:

- 1. Tyco Adhesives, Synergy Plant Coating System
- 2. Tyco Adhesives, VANGUARD Plant Coating System

## 2.4 STEEL PIPING, ABOVE GRADE

- A. Pipe: Standard wall, black steel, ASTM A53, Type E, Grade B or API 5L EW, Grade B or ASTM A106, Grade B. Welded for pipe sizes above 2 inches, threaded for pipe sizes 2 inches or less.
- B. Fittings: Malleable iron, threaded type, ANSI B16.3, Class 150 or standard wall, black steel, butt welding type, ASTM A234, Grade WPB.
- C. Flanges: Steel, weld neck, Class 150, raised face, ANSI B16.5.

- D. Gasket Material: Neoprene, durometer hardness 50-65.

## 2.5 PRESSURE REGULATOR STATION

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Regulator stations are limited to stations identified in the Civil Standard Drawings ST-G3060-2.

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- A. LANL's Support Services Subcontractor will furnish, install, and adjust pressure of gas regulator station.

## 2.6 SHUT-OFF VALVE, ABOVE GRADE, THREADED ENDS

- A. Manufacturer: Balon Series S42, No Substitution.
- B. Valve: Ductile iron body, threaded ends, non-lubricated full opening ball valve, wrench operated, 1000 psig working pressure, size [ 1 ], [ 2 ] inch.

## 2.7 SHUT-OFF VALVE, ABOVE GRADE, FLANGED ENDS

- A. Manufacturer: Balon Series F, No Substitution.
- B. Valve: Steel body, flanged ends, non-lubricated full opening ball valve, wrench operated, Class 150, size [ 2 ], [ 3 ], [ 4 ], [ 6 ], [8], [10] inch.

## 2.8 SHUT-OFF VALVE, ABOVE AND BELOW GRADE, WELDED ENDS

- A. Manufacturer: Balon Utility Seal, No Substitution.
- B. Valve: Steel body, butt welded ends, non-lubricated full opening ball valve, wrench operated, 150 psig working pressure, size [ 2 ], [ 3 ], [ 4 ], [ 6 ] inch.

## 2.9 SHUT-OFF VALVE, BELOW GRADE, POLYETHYLENE

- A. Manufacturer: Nordstrum Poly-Gas, No Substitution.
- B. Ball Valve for natural gas service, material PPI- PE 3408, C.P.Chem Performance Pipe (Driscopipe 8100), SDR11, iron pipe size 100 psig service pressure, butt fusion end connections. Full bore when available.

1. Valve Size: [ 1 ], [ 1 1/4 ], [ 2 ], [ 3 ], [ 4 ] inch.

## 2.10 ANODELESS RISER

- A. Manufacturer: R.W. Lyall and Company, Inc.

- B. Prebent, for use with C.P.Chem Performance Pipe (Driscopipe 8100) polyethylene piping, PPI-PE 3408, SDR11, iron pipe size NPT steel end by PE butt fusion, size to match piping system. Steel pipe shall be standard wall, black steel, API 5L EW, Grade A or ASTM A53, Type E, Grade A for 1 1/2 inch and less, Grade B for 2 inch and larger.

## 2.11 TRANSITION FITTING

- A. Manufacturer: R.W. Lyall and Company, Inc.
- B. Preformed steel pipe to PE pipe, for use with C.P. Chem Performance Pipe (Driscopipe 8100) polyethylene piping, PPI-PE 3408, SDR11, iron pipe size beveled steel end for welding by PE butt fusion, size to match piping system. Steel pipe shall be standard wall, black steel, API 5L EW, Grade A or ASTM A53, Type E, Grade A for 1 1/2 inch and less, Grade B for 2 inch and larger.

## 2.12 VALVE BOX

- A. Manufacturer: Tyler, Series 6860
- B. Valve Box: Cast iron, 5 1/4 inch shaft screw type, with lid marked gas, length to suit burial depth.

## 2.13 TEST PLUG (PETE'S PLUG)

- A. 1/4 inch NPT, brass body, neoprene core, rated for 1,000 psig, complete with sealing cap and gasket, to receive 1/8 inch O.D. probe.

# PART 3 EXECUTION

## 3.1 PREPARATION

- A. Ream pipe ends and remove burrs.
- B. Remove scale and dirt on inside and outside of piping before assembly.
- C. Keep open ends of pipe free from scale and dirt. Whenever work is suspended during construction, or at the end of each workday, protect open ends with temporary plugs or caps.

## 3.2 GENERAL INSTALLATION

- A. Furnish and install gas piping in accordance with Uniform Plumbing Code, Uniform Mechanical Code, ASME B31.1 Power Piping, ASME B31.8 Gas Transmission and Distribution Piping Systems, and 49 CFR 192 Code of Federal Regulations.
- B. Do not run gas piping below buildings, structures, or in crawl spaces.

- C. Do not run gas piping under walks and equipment pads adjacent to building. If unavoidable, sleeve line with non-metallic piping.
- D. Pressure test piping in accordance with Section 15992, Testing Piping Systems.
- E. Paint outside gas regulator piping, valves, and appurtenances above ground to match building exterior. Refer to Section 09900, Painting.
- F. Support piping in accordance with Section 15060, Hangers and Supports for Piping and Tubing.
- G. Test steel pipe coating in accordance with Section 15992, Testing Piping Systems.

### 3.3 NON-DESTRUCTIVE RADIOGRAPHIC EXAMINATION

- A. Test the natural gas steel piping for weld integrity.
  - 1. Pipeline 4 inches and larger shall be examined as required by American Petroleum Institute Standard 1104.
- B. Perform non-destructive radiographic examination.
  - 1. Prior to the start of radiography, the contractor shall notify LANL HSR-12 of the scope of work and the time and exact location of work.
  - 2. At the end of each shift, a copy of the inspection reports, diagrams, and radiographs for that shift will be left with designated University personnel.
  - 3. Rejected welds or material shall be brought to the attention of designated LANL Construction Inspector within 4 hours of rejection.

### 3.4 CLEANING OF NATURAL GAS PIPING INTERIOR

- A. Use a pipeline pig to clean the interior of natural gas piping. The pipeline pig used shall be of a type and configuration to provide optimum cleaning of scale, debris, and moisture from the pipeline interior.
  - 1. Soft pigs shall be used with polyethylene pipe to avoid damage to the pipe.
- B. A pressuring system shall be used to provide sufficient energy to drive the pig but to not overpressure the pipeline.
- C. A pig catcher of a design to provide a safe and effective means to receive the pig as it discharges from the line shall be used.

### 3.5 POLYETHYLENE PIPING INSTALLATION

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Refer to Civil Standard Drawing ST-G30GEN-4 for trench width and piping burial depth.

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- A. Lay piping on trench bottom in such a manner as to snake piping from one side of trench to the other with one cycle approximately every 40 feet. This will insure that sufficient piping material is available for expansion and contraction.
- B. Provide minimum of 5 feet of cover over piping installed under any roadways and vehicle parking areas.

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Use steel pipe if gas line is installed less than 20 feet from steam and condensate lines.

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- C. Perform butt heat-fusion joining in accordance with ASTM D2657 and manufacturer's written instructions. See PART 1, Quality Assurance.

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Refer to Civil Standard Drawings ST-G30GEN-3 and ST-G30GEN-4 for trenching, piping burial depth, warning tape, and tracer wire details.

Refer to the Engineering Standards Manual, Civil Chapter, Section G30, for required minimum utility line clearances

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- D. Refer to Drawings and Section 02310, Grading, Excavating, and Trenching, for earth cover, bedding, tracer wire, wire continuity test, warning tape, documenting new or exposed existing utility location, etc., requirements.
- E. Make plastic-to-steel connection with transition fitting that is butt fused on plastic end and welded on steel end.

### 3.6 HORIZONTAL DIRECTIONAL DRILLING OR CASED BORING

- A. Crossing of paved streets or roadways or other areas, if approved by LANL Utilities group representative, may be accomplished by horizontal directional drilling (HDD) or cased boring, whenever practical. Casings for steel carrier pipe are not allowed. The bore shall be kept to a maximum of 2 inches larger than the pipe or the casing. Care shall be exercised to ensure the paved surface is not damaged during the boring operation.
- B. Top of HDD or casing shall have a minimum below grade bury depth of 36 inches and a minimum bury depth of 60 inches below any paved surface. Any casing shall be designed to withstand superimposed loads. Depth shall not exceed excavation by standard, conventional means and shall be approved by LANL Utilities group representative.

- C. When pulling in pipe the pulling force shall be monitored and kept below the Allowable Tensile Load (ATL) value of the pipe size and material per manufacturers recommendation. Both pipe ends shall be monitored for continuous, smooth movement. Pulling load from the equipment shall be monitored and the pipe lead end shall be equipped with a weak link device to disengage at the ATL or below. Manufacturers procedures and design parameters shall be followed, in addition to ASTM F1962.
- D. The pipe shall be inserted into the casing in such a manner that the pipe and the casing insulators will not be damaged. Polyethylene pipe shall extend 3-5% of the pulled-in length past the termination points to allow for contraction. Polyethylene pipe shall be allowed 24 hours to recover from the pulling stress and contract to original pre-pull length and allowed to stabilize to buried soil temperature before final tie-ins are accomplished. A minimum of five (5) feet of pipe shall extend beyond the borehole or casing to allow for pipe damage assessment. Tracing wire shall be pulled in with the polyethylene pipe.
- E. The annulus between the casing and the pipe shall be sealed with a waterproof mechanical seal, i.e. a Link-Seal. Polyethylene pipe shall be allowed to snake in the casing and centering spacers are not required.

### 3.7 STEEL PIPING INSTALLATION

- A. Butt weld underground steel piping. See PART 1, Quality Assurance.
- B. Use threaded joints for above grade piping 2 inches and smaller and butt-welded joints for piping above 2 inches.
- C. Apply Polyken primer 1019 or 1027 to underground joints, fittings, and valves, and spiral wrap with a double layer, half lapped, 35 mil tape, Polyken 934 system. Follow manufacturer's instructions.

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Refer to Civil Standard Drawings ST-G30GEN-3 and ST-G30GEN-4 for trenching, warning tape, and tracer wire details.

Refer to the Engineering Standards Manual, Civil Chapter, Section G30, for required minimum utility line clearances

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- D. Refer to Drawings and Section 02310, Grading, Excavating, and Trenching, for earth cover, bedding, tracer wire, wire continuity test, warning tape, documenting new or exposed existing utility location, etc., requirements.



### 3.8 PIPING TIE-IN

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Refer to Civil Standard Drawings ST-G3060-1 for gas piping tie-in details

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- A. Tie-in to existing system will be performed by LANL's Support Services Subcontractor (SSS). Excavation, backfill, and materials required for tie-in shall be provided by Contractor. Tie-in will be inspected by LANL Construction Inspector and the LANL Utilities Group gas system representative.
- B. Notify LANL Construction Inspector at least 10 working days in advance to schedule tie-in. The LANL Construction Inspector will notify LANL's SSS.
- C. Prior to notifying SSS, the LANL Construction Inspector will ensure materials required for tie-in are on site, service lines have been tested, material submittals and all test reports have been approved by LANL Utilities Group and bell hole is dug.

### 3.9 CORROSION CONTROL (STEEL PIPING BELOW GRADE)

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Contact LANL's SSS Utilities Corrosion Specialist (665-5270), or the LANL Utilities Group Gas System Representative, (665-2612) for cathodic protection requirements. Also refer to the ESM Electrical Chapter, Section G4040.

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END OF SECTION

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Do not delete the following reference information:

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FOR LANL USE ONLY

This project specification is based on LANL Master Construction Specification Rev. 5, dated November 24, 2004.